



10/506825  
YCT/EP 03/02072  
Rec'd PCT/PTO 07 SEP 2004 03

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INVESTOR IN PEOPLE

The Patent Office  
Concept House  
Cardiff Road  
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*Heaven*

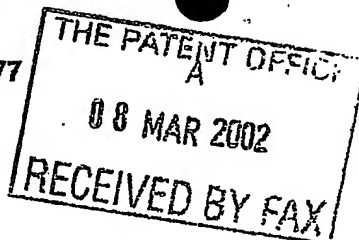
Dated

28 February 2003

**PRIORITY  
DOCUMENT**

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Patents Form 1/77

Patents Act 1977  
(Rule 18)The  
Patent  
OfficeOSHAR02 E702414-1 000085  
P01/7700 0.00-0205508.5**Request for grant of a patent**

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

- 8 MAR 2002

The Patent Office

Cardiff Road  
Newport  
South Wales  
NP9 1RH**1. Your reference**

ADM/6880 GB

**2. Patent application number**

(The Patent Office will fill in this part)

0205508.5

**3. Full name, address and postcode of the or of each applicant (underline all surnames)**The Timken Company  
1835 Dueber Avenue S.W.  
Canton  
Ohio 44706-2798  
USA

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

USA 4015012001

**4. Title of the invention**

Improvements in or Relating to Bearings

**5. Name of your agent (if you have one)**

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

Stevens Hewlett & Perkins  
1 St Augustines Place  
Bristol BS1 4UD

Patents ADP number (if you know it)

1545002 ✓

**6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number**

Country

Priority application number  
(if you know it)Date of filing  
(day / month / year)**7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application**

Number of earlier application

Date of filing  
(day / month / year)**8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:**

- a) any applicant named in part 3 is not an inventor, or
- b) there is an inventor who is not named as an applicant, or
- c) any named applicant is a corporate body.

See note (d))

Yes

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## Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form

Description

3

Claim(s)

Abstract

Drawing(s)

3

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for preliminary examination and search (Patents Form 9/77)

Request for substantive examination (Patents Form 10/77)

Any other documents (please specify)

11.

I/We request the grant of a patent on the basis of this application.

Signature

Stevens Hewlett Perkins

Date

08.03.02

STEVENS HEWLETT &amp; PERKINS

12. Name and daytime telephone number of person to contact in the United Kingdom

DAVID MARLES 0117 9226007

## Warning

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## Notes

- a) If you need help to fill in this form or you have any questions, please contact the Patent Office on 0645 500505.
- b) Write your answers in capital letters using black ink or you may type them.
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- d) If you have answered 'Yes' Patents Form 7/77 will need to be filed.
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### Improvements in or Relating to Bearings

The present invention relates to bearings primarily, but not exclusively for use in integrated steering pivot packages for the driving and steering axle of, for example, agricultural or industrial vehicles.

According to a first aspect of the present invention there is provided a bearing having a radially inner cone defining a circumferentially extending inner raceway, a cage retaining therein at spaced locations rolling elements which contact the inner raceway, the cage being retained relative to the inner cone by means of a clip connection.

Preferably an outer cone defining a circumferentially extending outer raceway is also provided, the outer raceway engaging the rolling elements. Conveniently, the rolling elements are tapered rollers.

In some arrangements the inner cone is formed integrally as part of a pivot pin.

It is a preferred feature that the clip connection is constituted by resilient radially inward projections provided at spaced locations around the large end of the cage, the projections being received in a circumferential groove in the large outside diameter of the inner cone. Normally the large axial end of the inner raceway has a circumferential rib against which the rolling elements engage and the circumferential groove is provided immediately axially behind the rib.

According to a second aspect there is provided an integrated steering pivot incorporating a bearing as described above where the inner cone is formed integrally as part of a pivot pin, the pin having a flange at its end remote from the narrow end of the inner cone, the flange having a number of holes for facilitating attachment to a support arm.

Embodiments of the present invention will now be described in more detail, the description making reference to the following drawings in which:

Figure 1 is a vertical cross-section through one end of a driving and steering axle, ideally for agricultural or industrial vehicles,

Figure 2 is a cross-section in isolation of an integrated steering pivot illustrated in figure 1,

Figure 3 is a cross-section of a pivot pin incorporated in the steering pivot of figure 2,

Figure 4 is a perspective view of a roller cage utilised in the present invention, and

Figure 5 is a cross-section similar to figure 2 of an alternative embodiment.

In figures 1 to 4 there is shown a generally known integrated steering pivot package 10 for the driving and steering axle 11 of a vehicle which may, for example, be agricultural or industrial. In such an arrangement there are a pair of integrated steering pivots 12 at each end of the axle 11, each pivot 12 being secured with respect to a support arm 13 by means of bolts 14 which extend through respective holes in a flange portion 15 at one end of a pivot pin 16.

Each pivot pin 16, made for example from steel, has at its other end an integrally formed inner cone section 17 which provides an inclined inner raceway 18 for a set of tapered rollers 19. The rollers are retained in a roller cage 20, made for example from a suitable polymer compound. At the large end of the inner raceway, nearer the flange portion 15, is a peripheral rib 21 which acts as an abutment for the rollers 19. Further towards the flange 15 and immediately beyond the peripheral rib 21 is an annular groove 22.

The cage 20 is largely conventional in appearance having a narrow end 33, a large end 24 and a series of openings 25 spaced around its periphery for receiving the rollers 19. At the large end 24 there are a number of resilient inward projections 26 at spaced locations around the periphery. The cage 20 is clipped on to the pivot pin 16 by means of the

projections 26 moving resiliently past the rib 21 and engaging in the annular groove 22 behind the rib 21. This retention of the cage 20 and associated rollers 19 relative to the inner cone section 17 means that it is not necessary to provide a further rib, as is conventional, at the small end of the inner raceway, that is at the end of the inner raceway most remote from the flange 15.

Each pivot 12 also provides an outer cone 27 which provides an inclined outer raceway 28 for engagement with the rollers 19 in a conventional manner, the outer cone 27 being connected to a further component of the vehicle which has not been shown.

In figure 5 there is shown a steering pivot pin 112 having a pivot 116 similar to that shown in figures 1 to 3 (like parts having a prefix '1'). In this embodiment there is an axial extension 150 remote from the flange 115. The extension 150 has an axial groove 151 for receiving a sensor (not shown) such as a speed sensor.

It will be appreciated that the number and precise form of the projections 26 is a matter of design choice but in the illustrated embodiment there are ten equispaced projections for a twenty roller cage, i.e. two rollers per projection. In addition the projections 26 have been located at the junctions of every other axial divider 29 and the large peripheral ring 30 defining the cage 20, but alternatives could be envisaged. Suitable modifications would be possible to accommodate cages of different size and construction.

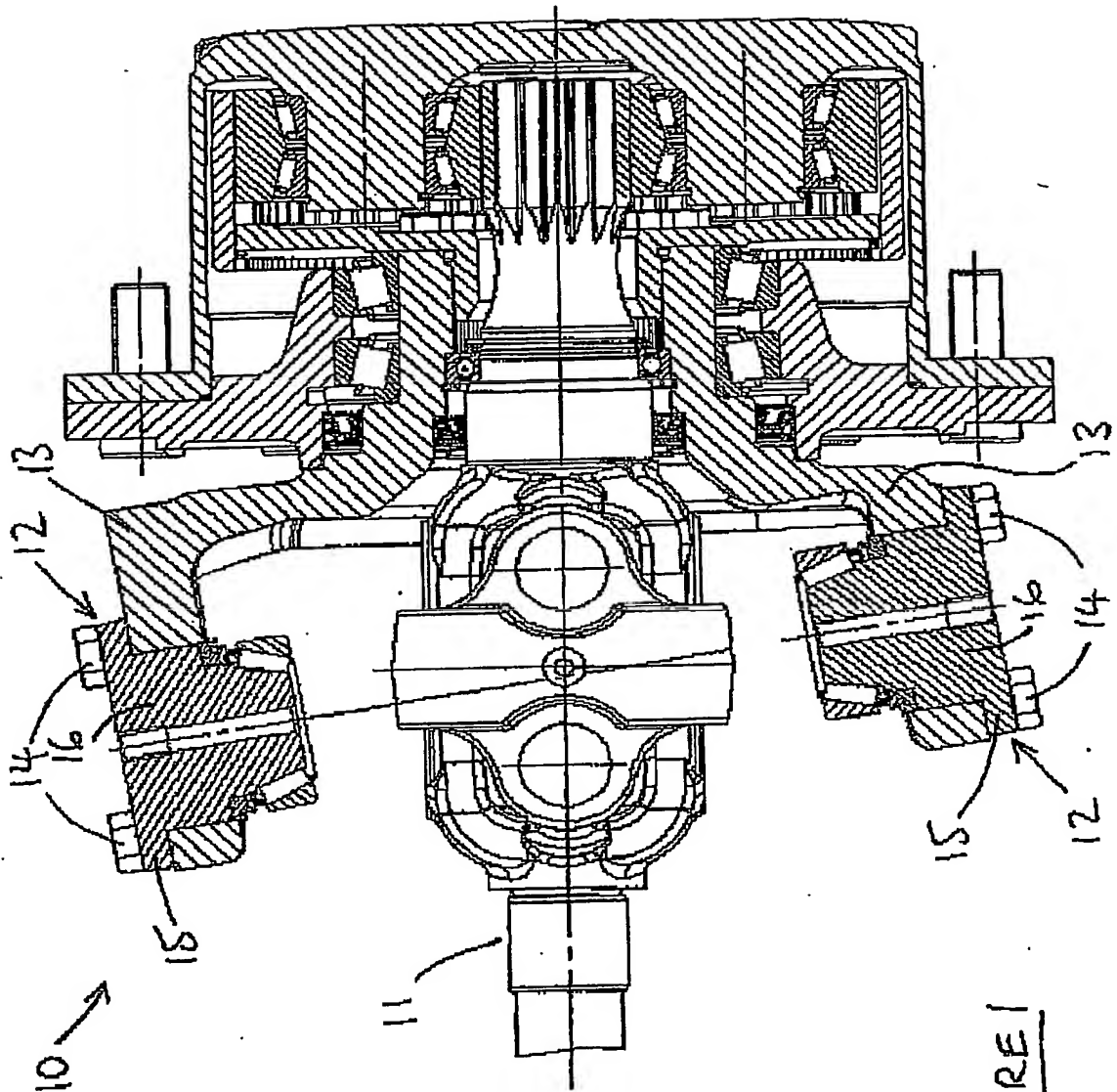


FIGURE 1

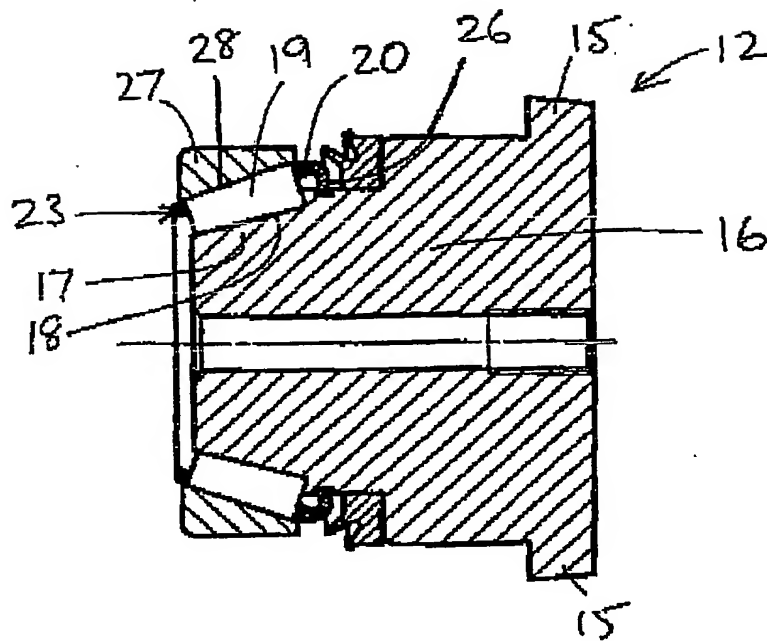


FIGURE 2

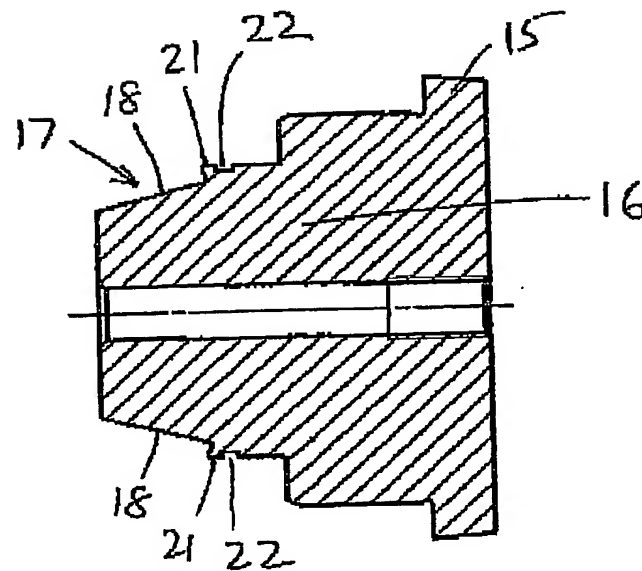


FIGURE 3



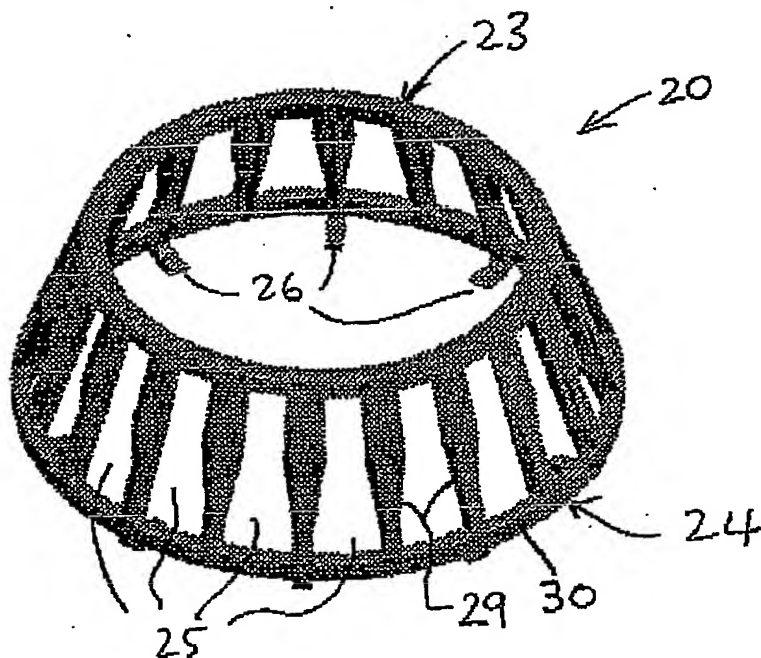


FIGURE 4

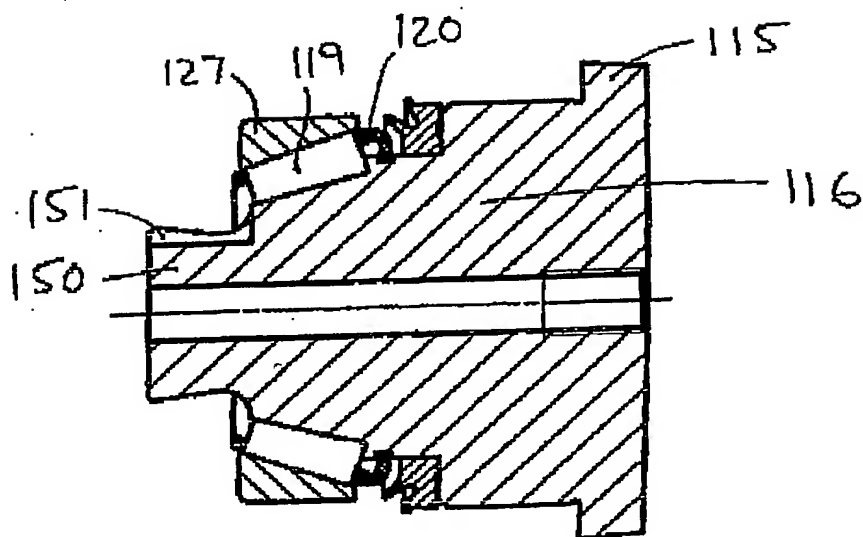


FIGURE 5